



DOCKET NO.: ISIS-5243

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

**In Re Application of:**

**Vasulinga T. Ravikumar, et al.**

**Application No.: 10/665,822**

**Filing Date: September 19, 2003**

**For: SYNTHESIS OF OLIGONUCLEOTIDES**

**Confirmation No.: Not Yet Assigned**

**Group Art Unit: Not Yet Assigned**

**Examiner: Not Yet Assigned**

DATE OF DEPOSIT: *October 13, 2003*

I HEREBY CERTIFY THAT THIS PAPER IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE AS FIRST CLASS MAIL, POSTAGE PREPAID, ON THE DATE INDICATED ABOVE AND IS ADDRESSED TO THE UNITED STATES PATENT AND TRADEMARK OFFICE, P.O. BOX 1450, ALEXANDRIA, VA 22313-1450.

*Elizabeth A. McLoud*

TYPED NAME: Elizabeth A. McLoud

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

**INFORMATION DISCLOSURE STATEMENT**

Pursuant to 37 CFR § 1.56 and in accordance with 37 CFR §§ 1.97-1.98, information relating to the above-identified application is hereby disclosed. Inclusion of information in this statement is not to be construed as an admission that this information is material as that term is defined in 37 CFR § 1.56(b).

- ☒ In accordance with § 1.97(b), since this Information Disclosure Statement is being filed either within three months of the filing date of the above-identified application, within three months of the date of entry into the national stage of the above identified application as set forth in § 1.491, before the mailing date

of a first Office Action on the merits of the above-identified application, or before the mailing date of a first Office Action after the filing of request for continued examination under § 1.114, no additional fee is required.

- ☐ In accordance with § 1.129(a), this Information Disclosure Statement is being filed in connection with ☐ the first or ☐ second After Final Submission, therefore:

☐ Certification in Accordance with § 1.97(e) is attached; or

☐ The fee of **\$180.00** as set forth in § 1.17(p) is attached.

- ☐ In accordance with § 1.97(c), this Information Disclosure Statement is being filed after the period set forth in § 1.97(b) above but before the mailing date of either a Final Action under § 1.113 or a Notice of Allowance under § 1.311, or before an action that otherwise closes prosecution in the application, therefore:

☐ Certification in Accordance with § 1.97(e) is attached;

or

☐ The fee of **\$180.00** as set forth in § 1.17(p) is attached.

- ☐ In accordance with § 1.97(d), this Information Disclosure Statement is being filed after the mailing date of either a Final Action under § 1.113 or a Notice of Allowance under § 1.311 but before, or simultaneously with, the payment of the Issue Fee, therefore included are: Certification in Accordance with § 1.97(e); and the submission fee of **\$180.00** as set forth in § 1.17(p).

- ☐ Copies of each of the references listed on the attached Form PTO-1449 are enclosed herewith.

- ☒ Copies of references listed on the attached Form PTO-1449 are enclosed herewith
- ☒ Copies of references listed on the attached Form PTO 1449 are not required to be submitted pursuant to the June 30, 2003 recent revisions to 37 CFR § 1.98(a)(2)(i).

## EXCEPT THAT:

- ☐ In view of the voluminous nature of references [list as appropriate], and the likelihood that these references are available to the Examiner, copies are not enclosed herewith.
- ☒ In accordance with § 1.98(d), copies of the following references listed on the attached Form PTO-1449 are not enclosed herewith because they were previously cited by or submitted to the U.S. Patent and Trademark Office in patent application(s) for which a claim for priority under 35 U.S.C. § 120 have been made in the instant application:
- ☒ Copies of references **1-5, 30-34 and 52-53** listed on the attached Form PTO-1449 were previously cited by or submitted to the Patent and Trademark Office in prior Application No. **08/099,075 now U.S. Patent 5,614,621**, filed **July 29, 1993**; copies of references **6-23 and 35-41** listed on the attached Form PTO-1449 were previously cited by or submitted to the Patent and Trademark Office in prior Application No. **08/249,442 now U.S. Patent 5,571,902**, filed **May 26, 1994**; copies of references **24-29, 42-48 and 54-57** listed on the

**DOCKET NO.: ISIS-5243**

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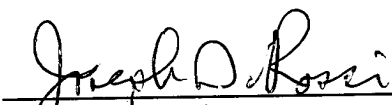
**PATENT**

attached Form PTO-1449 were previously cited by or submitted  
to the Patent and Trademark Office in prior Application No.  
**08/692,909 now U.S. Patent 6,001,982, filed July 31, 1996.**

Please charge any deficiency or credit any overpayment to Deposit Account No. 23-  
3050. This form is submitted in duplicate.

- ☐ The relevance of those listed references which are not in the English language is as follows:
- ☒ There are no listed references which are not in the English language.

Date: *October 13, 2003*

  
\_\_\_\_\_  
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<b>Form PTO-1449 Modified</b>  List of Patent and Publications Cited by Applicant (Use several sheets if necessary)  U.S. Department of Commerce Patent and Trademark Office	Docket No. ISIS-5243	Application No. 10/665,822
	Applicant Vasulinga T. Ravikumar, et al.	
	Filing Date September 19, 2003	Group Not Yet Assigned
	Confirmation No. Not Yet Assigned	
<b>OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)</b>		
	1	Celebuski, et al., "Synthesis and Utility of a DNA Phosphorylating Agent Based on 2-(Triphenylsilyl)ethanol", <i>J. Org. Chem.</i> , 57, (1992), 5535-5538
	2	Honda, et al., "2-Diphenylmethylsilylethyl Group as a New Protecting Group of Internucleotidic Phosphates in Oligonucleotide Synthesis", <i>Tetrahedron Letters</i> , (1981), 2093-2096
	3	March, "Advanced Organic Chemistry", John Wiley & Sons, New York, Third Edition, (1985), Chapter 1, pgs. 16-18 and Chapter 9, pgs. 237-239
	4	Streitwieser and Heathcock, "Introduction to Chemistry", Second Edition, (1981), Chapter 15, 437-440
	5	Takaku, et al., "Use of 1,1,1,3,3,3-Hexafluoro-2-Propyl Protecting Group in the Synthesis of DNA Fragments Via Phosphoramidite Intermediates", <i>Tetrahedron Letters</i> , 29, (1988), 81-84
	6	Beaucage, S. et al., "Advances in the Synthesis of Oligonucleotides by the Phosphoramidite Approach", <i>Tetrahedron</i> 1992, 48(12), 2223-2311.
	7	Burch, R. et al., "Oligonucleotides Antisense to the Interleukin 1 Receptor mRNA Block the Effects of Interleukin 1 in Cultures Murine and Human Fibroblasts and in Mice", <i>The Journal of Clinical Investigation, Inc.</i> 1991, 88, 1190-1196.
	8	Higgins, "Medical Sciences", <i>PNAS USA</i> 1993, 90, 9903-9905.
	9	Iyer, R. et al., "3H-1,2-Benzodithiole-3-one 1,1-Dioxide as an Improved Sulfurizing Reagent in the Solid-Phase Synthesis of Oligodeoxyribonucleoside Phosphorothioates", <i>J. Am. Chem. Soc.</i> 1990, 112, 1253-1254.
	10	Iyer, R. et al., "The Automated Synthesis of Sulfur-Containing Oligodeoxyribonucleotides Using 3H-1,2-Benzodithiol-3-one 1,1-Dioxide as a Sulfur-Transfer Reagent", <i>J. Org. Chem.</i> 1990, 55(15), 4693-4699.
<b>EXAMINER</b>		<b>DATE CONSIDERED</b>



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		Confirmation No. Not Yet Assigned	
<b>OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)</b>			
	11	Kamer, P. et al., "An Efficient Approach Toward the Synthesis of Phosphorothioate Diesters via the Schonberg Reaction", <i>Tetrahedron Letters</i> <b>1989</b> , 30(48), 6757-6760.	
	12	Kitajima, I. et al., "Ablation of Transplanted HTLV-I Tax-Transformed Tumors in Mice by Antisense Inhibitor of NF- $\kappa$ B", <i>Science</i> <b>1992</b> , 258, 1792-1795.	
	13	Offensperger, W.-B. et al., "In vivo Inhibition of Duck Hepatitis B Virus Replication and Gene Expression by Phosphorothioate Modified Antisense Oligodeoxynucleotides", <i>The EMBO Journal</i> <b>1993</b> , 12(3), 1257-1262.	
	14	Rao, M.V. et al. "Dibenzoyl Tetrasulphide - A Rapid Sulphur Transfer Agent in the Synthesis of Phosphorothioate Analogues of Oligonucleotides", <i>Tetrahedron Letters</i> <b>1992</b> , 33(33), 4839-4842.	
	15	Simons, M. et al., "Antisense c-myc Oligonucleotides Inhibit Intimal Arterial Smooth Muscle Cell Accumulation in vivo", <i>Nature</i> <b>1992</b> , 359, 67-70.	
	16	Vu, H. et al., "Internucleotide Phosphite Sulfurization with Tetraethylthiuram Disulfide. Phosphorothioate Oligonucleotide Synthesis via Phosphoramidite Chemistry", <i>Tetrahedron Letters</i> <b>1991</b> , 32(26), 3005-3008.	
	17	Vlassov, V., "Inhibition of Tick-Borne Viral Encephalitis Expression Using Covalently Linked Oligonucleotide Analogs", in "Oligodeoxynucleotides as Antisense Inhibitors of Gene Expression: Therapeutic Implications", June 18-21, 1989, Sheraton Potomac Inn, Rockville, MD.	
	18	Wright, P. et al., "Large Scale Synthesis of Oligonucleotides via Phosphoramidite Nucleosides and a High-loaded Polystyrene Support", <i>Tetrahedron Letters</i> <b>1993</b> , 34(21), 3373-3376.	
	19	Wolter, A., et al., "Polymer Support Oligonucleotide Synthesis XX: Synthesis of Henhectacosa Deoxynucleotide by Use of a Dimeric Phosphoramidite Synthon", <i>Nucleosides &amp; Nucleotides</i> <b>1986</b> , 5(1), 65-77.	
	20	Bannwarth, W., "Synthesis of Oligodeoxynucleotides by the Phosphite-Triester Method Using Dimer Units and Different Phosphorous-Protecting Groups", <i>Helvetica Chimica Acta</i> <b>1985</b> , 68, 1907-1913.	
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<b>U. S. PATENT DOCUMENTS</b>							
Examiner Initial	No.	Document No.	Date	Name	Class	Subclass	
	30	4,458,066	7/3/84	Caruthers, et al.	536	27	
	31	4,490,300	03/1990	Urdea, et al.	536	28.5	
	32	4,725,677	2/16/88	Koster, et al.	536	27	
	33	4,845,205	7/4/89	Huynh Dinh, et	536	28	
	34	5,113,005	5/12/92	Celebuski	556	449	
	35	3,687,808	08/29/72	Merigan Jr. et al	195	28N	
	36	4,806,463	02/21/89	Goodchild et al.	435	5	
	37	5,113,005	05/12/92	Celebuski	556	449	
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	40	5,264,423	11/23/93	Cohen et al.	514	44	
	41	5,276,019	01/04/94	Cohen et al.	514	44	
	42	4,786,724	11/1998	Letsinger	536	27	
	43	5,510,240	04/1996	Lam, et al.	514	44	
	44	5,571,902	11/1996	Ravikumar, et al.			
	45	5,608,046	03/1997	Cook, et al.	536	25.3	
	46	5,610,289	03/1997	Cook, et al.	536	25.34	
	47	5,614,621	03/1997	Ravikumar, et al.	536	25.34	
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	48	6,001,982	12/14/99	Ravikumar, et al.	536	22.1	
	49	5,847,106	12/1998	Ravikumar, et al.	536	25.34	
	50	6,211,350	04/2001	Ravikumar, et al.	536	23.1	
	51	6,486,312 B2	11/26/02	Ravikumar, et al.	536	25.3	
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<b>FOREIGN PATENT DOCUMENTS</b>							
Examiner Initial		Document No.	Date	Country	Translation		
					YES	NO	
	52	WO 91/04983	4/18/91	PCT			
	53	WO 92/21689	12/10/92	PCT			
	54	WO 89/11486	11/1989	PCT			
	55	WO 93/21203	10/1993	PCT			
	56	WO 94/06811	03/1994	PCT			
	57	WO 95/13833	05/1995	PCT			
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